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EXAMINER
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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

	Application No.	Applicant(s)
	10/589,349	ABE ET AL.
Office Action Summary	Examiner	Art Unit	
	LI LIU	2613	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 December 2009</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>12-33</u> is/are pending in the application.

  4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>12-33</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>11 August 2006</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

  a)☐ All b)☐ Some * c)☐ None of:

    1.☐ Certified copies of the priority documents have been received.

    2.☐ Certified copies of the priority documents have been received in Application No. _____.

    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
       application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date <u>2/2/2010</u>.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

1.   The information disclosure statement (IDS) submitted on 2/2/2010 is being

considered by the examiner.

Response to Arguments

2.   Applicant's arguments with respect to claims 12 and 22 have been considered

but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 12-14, 16, 18, 22-25, 27, 29 and 33 are rejected under 35 U.S.C. 103(a)

as being unpatentable over Tomizawa et al (US 2003/0118345).

       1). With regard to claim 12, Tomizawa et al discloses an optical receiver (e.g.,

Figures 3-10) comprising:

       an optical divider (e.g., the distribution circuit in Figures 3, 8 and 9 etc) that

divides an optical input signal into a plurality of paths;

a plurality of optical-to-electrical converters (e.g., the photodetectors in Figures 3, 8 and 9 etc) that respectively converts the divided optical input signals into electrical signals;

a plurality of discriminators (e.g., the decision circuits in Figures 3, 8 and 9 etc) that respectively outputs discrimination results by discriminating the electrical signals output from the optical-to-electrical converters based on predetermined thresholds (the predetermined thresholds: threshold value 1, threshold value 2 etc, or threshold value H, threshold value L etc are used by the discriminators); and

an operational circuit (e.g., the Consensus Logic 4 with the Selection Circuit 5 in Figures 3, 8 and 9 etc) that performs a predetermined logical operation with the discrimination results output from the discriminators ([0045], [0069] and [0070] etc).

Tomizawa et al teaches that the predetermined thresholds (e.g., the threshold values 1-n or threshold values H and L) are imparted to the plurality of discriminators. But, Tomizawa et al does not expressly disclose wherein said predetermined thresholds imparted to the plurality of discriminators are determined according to a predetermined logical operation, and then the operational circuit performs the predetermined logical operation.

However, Tomizawa et al discloses "when the threshold values of the decision circuits 3-11 and 3-12 are set lower than the standard threshold value, the same effect can be achieved by inverting the above logic" ([0072]). That is, when the threshold values is changed, a different logic operation is used; or different decision threshold uses different logic operation, and the logic operation can based on the selected

decision thresholds. Tomizawa teaches that the levels of the decision threshold and the logical operation are related with each other (logical operation $\propto$ decision threshold), therefore, it is obvious to one skilled in the art that the thresholds imparted to the plurality of discriminators can also be determined according to a selected logical operation (decision threshold $\propto$ logical operation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the strategy of choosing proper threshold values based on the selected logical operation to the system of Tomizawa et al so that the receiver can discriminate the input signal more accurately, and the system reliability can be enhanced.

2). With regard to claim 13, Tomizawa et al discloses all of the subject matter as applied to claim 12 above, and Tomizawa et al further discloses wherein the predetermined thresholds are different from an optimum threshold that is used when discriminating the optical input signals divided into the paths with a single discriminator (Tomizawa et al discloses that the plurality of predetermined thresholds have different values, that is, the predetermined thresholds are different from the single optimum threshold that is used when discriminating the optical input signals divided into the paths with a single discriminator; [0038] and [0039], the thresholds are different from the optimum fixed threshold. Also Tomizawa et al discloses that the threshold value of each decision circuit can be set higher (or lower) than the standard threshold value, [0069]-[0072]).

3). With regard to claim 14, Tomizawa et al discloses all of the subject matter as

applied to claim 12 above, and Tomizawa et al further discloses wherein

the optical divider is an optical polarization divider (Figure 6, polarization beam

splitter can be used to divide the input signal) that divides the optical input signal based

on a polarization state of the optical input signal ([0061], "[t]he polarization beam splitter

25 splits optical signals of two polarization modes into each polarization").

4). With regard to claim 16, Tomizawa et al discloses all of the subject matter as

applied to claim 12 above, and Tomizawa et al further discloses wherein the

predetermined thresholds of the discriminators are substantially equal (e.g., Figure 8,

the predetermined thresholds of the discriminators are substantially equal: the threshold

value H).

5). With regard to claim 18, Tomizawa et al discloses all of the subject matter as

applied to claim 12 above, and Tomizawa et al further discloses wherein the operational

circuit is a logical OR circuit (e.g., Figure 8 and [0070]-[0072]).

6). With regard to claim 22, Tomizawa et al discloses an optical communication

system (e.g., Figures 3-10) comprising:

an optical transmitter (e.g., the optical transmitter shown in Figures 5-7) that

transmits an optical signal; and

an optical receiver (e.g., Figures 3-10) that receives the optical signal transmitted

from the optical transmitter, wherein

the optical receiver includes

an optical divider (e.g., the distribution circuit in Figures 3, 8 and 9 etc) that divides the received optical signal into a plurality of paths;

a plurality of optical-to-electrical converters (e.g., the photodetectors in Figures 3, 8 and 9 etc) that respectively converts the divided optical input signals into electrical signals;

a plurality of discriminators (e.g., the decision circuits in Figures 3, 8 and 9 etc) that respectively outputs discrimination results by discriminating the electrical signals output from the optical-to-electrical converters based on predetermined thresholds (the predetermined thresholds: threshold value 1, threshold value 2 etc, or threshold value H, threshold value L etc are used by the discriminators); and

an operational circuit (e.g., the Consensus Logic 4 with the Selection Circuit 5 in Figures 3, 8 and 9 etc) that performs a predetermined logical operation with the discrimination results output from the discriminators ([0045], [0069] and [0070] etc).

Tomizawa et al teaches that the predetermined thresholds (e.g., the threshold values 1-n or threshold values H and L) are imparted to the plurality of discriminators. But, Tomizawa et al does not expressly disclose wherein said predetermined thresholds imparted to the plurality of discriminators are determined according to a predetermined logical operation, and then the operational circuit performs the predetermined logical operation.

However, Tomizawa et al discloses "when the threshold values of the decision circuits 3-11 and 3-12 are set lower than the standard threshold value, the same effect can be achieved by inverting the above logic" ([0072]). That is, when the threshold

values is changed, a different logic operation is used; or different decision threshold

uses different logic operation, and the logic operation can based on the selected

decision thresholds. Tomizawa teaches that the levels of the decision threshold and the

logical operation are related with each other (logical operation $\propto$ decision threshold),

therefore, it is obvious to one skilled in the art that the thresholds imparted to the

plurality of discriminators can also be determined according to a selected logical

operation (decision threshold $\propto$ logical operation).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to apply the strategy of choosing proper threshold values

based on the selected logical operation to the system of Tomizawa et al so that the

receiver can discriminate the input signal more accurately, and the system reliability can

be enhanced.

7). With regard to claim 23, Tomizawa et al discloses an optical reception method

(e.g., Figures 3-10) comprising:

dividing, by an optical divider (e.g., the distribution circuit in Figures 3, 8 and 9

etc), an optical input signal into a plurality of paths;

converting the divided optical input signals into respective electrical signals (e.g.,

the photodetectors, in Figures 3, 8 and 9 etc, respectively converts the divided optical

input signals into electrical signals);

outputting discrimination results by discriminating the respective converted

electrical signals based on predetermined thresholds (e.g., the decision circuits in

Figures 3, 8 and 9 etc respectively outputs discrimination results by discriminating the

electrical signals based on predetermined thresholds. E.g., the predetermined thresholds: threshold value 1, threshold value 2 etc, or threshold value H, threshold value L etc are used by the discriminators); and

performing said predetermined logical operation with the outputted discrimination results (e.g., the Consensus Logic 4 with the Selection Circuit 5 in Figures 3, 8 and 9 etc performs a predetermined logical operation with the discrimination results output from the decision circuits; [0045], [0069] and [0070] etc).

Tomizawa et al teaches that the predetermined thresholds (e.g., the threshold values 1-n or threshold values H and L) are imparted to the plurality of discriminators. But, Tomizawa et al does not expressly disclose wherein said predetermined thresholds imparted to the plurality of discriminators are determined according to a predetermined logical operation, and then performing the predetermined logical operation.

However, Tomizawa et al discloses "when the threshold values of the decision circuits 3-11 and 3-12 are set lower than the standard threshold value, the same effect can be achieved by inverting the above logic" ([0072]). That is, when the threshold values is changed, a different logic operation is used; or different decision threshold uses different logic operation, and the logic operation can based on the selected decision thresholds. Tomizawa teaches that the levels of the decision threshold and the logical operation are related with each other (logical operation $\propto$ decision threshold), therefore, it is obvious to one skilled in the art that the thresholds imparted to the plurality of discriminators can also be determined according to a selected logical operation (decision threshold $\propto$ logical operation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the strategy of choosing proper threshold values based on the selected logical operation to the system/method of Tomizawa et al so that the receiver can discriminate the input signal more accurately, and the system reliability can be enhanced.

8). With regard to claim 24, Tomizawa et al discloses all of the subject matter as applied to claim 23 above, and Tomizawa et al further discloses wherein the predetermined thresholds are different from an optimum threshold that is used when discriminating the optical input signals divided into the paths with a single discriminator (Tomizawa et al discloses that the plurality of predetermined thresholds have different values, that is, the predetermined thresholds are different from the single optimum threshold that is used when discriminating the optical input signals divided into the paths with a single discriminator; [0038] and [0039], the thresholds are different from the optimum fixed threshold. Also Tomizawa et al discloses that the threshold value of each decision circuit can be set higher (or lower) than the standard threshold value, [0069]-[0072]).

9). With regard to claim 25, Tomizawa et al discloses all of the subject matter as applied to claim 23 above, and Tomizawa et al further discloses wherein

dividing the optical input signal based on a polarization state of the optical input signal (Figure 6, polarization beam splitter can be used to divide the input signal; [0061], "[t]he polarization beam splitter 25 splits optical signals of two polarization modes into each polarization").

10). With regard to claim 27, Tomizawa et al discloses all of the subject matter as
applied to claim 23 above, and Tomizawa et al further discloses wherein

the predetermined thresholds of the discriminators are substantially equal (e.g.,
Figure 8, the predetermined thresholds of the discriminators are substantially equal: the
threshold value H).

11). With regard to claim 29, Tomizawa et al discloses all of the subject matter as
applied to claim 23 above, and Tomizawa et al further discloses wherein the operational
circuit is a logical OR circuit (e.g., Figure 8 and [0070]-[0072]).

12). With regard to claim 33, Tomizawa et al discloses an optical communication
method comprising:

transmitting an optical signal (e.g., the optical transmitter shown in Figures 5-7
that transmits an optical signal); and

receiving the optical signal transmitted (e.g., the receiver Figure 3-10 receives
optical signal transmitted), wherein

the receiving includes:

dividing, by an optical divider, an optical input signal into a plurality of paths (e.g.,
the distribution circuit, in Figures 3, 8 and 9 etc, divides the received optical signal into a
plurality of paths);

converting the divided optical input signals into respective electrical signals (e.g.,
the photodetectors, in Figures 3, 8 and 9 etc, respectively converts the divided optical
input signals into electrical signals);

outputting discrimination results by discriminating the respective converted

electrical signals based on predetermined thresholds (e.g., the decision circuits in

Figures 3, 8 and 9 etc respectively outputs discrimination results by discriminating the

the respective converted electrical signals based on predetermined thresholds. E.g., the

predetermined thresholds: threshold value 1, threshold value 2 etc, or threshold value

H, threshold value L etc are used by the discriminators); and

performing said predetermined logical operation with the outputted discrimination

results (e.g., the Consensus Logic 4 with the Selection Circuit 5 in Figures 3, 8 and 9

etc performs a predetermined logical operation with the outputted discrimination results,

[0045], [0069] and [0070] etc).

wherein said predetermined thresholds are determined according to a

predetermined logical operation; and

Tomizawa et al teaches that the predetermined thresholds (e.g., the threshold

values 1-n or threshold values H and L) are imparted to the plurality of discriminators.

But, Tomizawa et al does not expressly disclose wherein said predetermined thresholds

are determined according to a predetermined logical operation, and then performing the

predetermined logical operation.

However, Tomizawa et al discloses "when the threshold values of the decision

circuits 3-11 and 3-12 are set lower than the standard threshold value, the same effect

can be achieved by inverting the above logic" ([0072]). That is, when the threshold

values is changed, a different logic operation is used; or different decision threshold

uses different logic operation, and the logic operation can based on the selected

decision thresholds. Tomizawa teaches that the levels of the decision threshold and the

logical operation are related with each other (logical operation $\propto$ decision threshold),

therefore, it is obvious to one skilled in the art that the thresholds imparted to the

plurality of discriminators can also be determined according to a selected logical

operation (decision threshold $\propto$ logical operation).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to apply the strategy of choosing proper threshold values

based on the selected logical operation to the system and method of Tomizawa et al so

that the receiver can discriminate the input signal more accurately, and the system

reliability can be enhanced.

5.   Claims 15 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Tomizawa et al (US 2003/0118345) as applied to claims 12, 14, 23 and 25 above,

and in further view of Naito et al (US 5,052,051).

1). With regard to claim 15, Tomizawa et al disclose all of the subject matter as

applied to claims 12 and 14 above, but Tomizawa et al does not expressly disclose an

optical polarization controller provided at a pre-stage of the optical polarization divider; a

plurality of power monitoring units that respectively monitors optical signal powers on

the paths; and a control circuit that controls the optical polarization controller based on

the optical signal powers, wherein the control circuit controls the optical polarization

controller such that output values of the optical signal powers monitored by the optical

monitors become substantially equal.

In Figure 6, Tomizawa et al discloses that a polarization splitter can be used to divide the input signal. However, for a system as shown in Figure 8, or a transmitter as shown in Figures 5 and 7, when a polarization beam splitter is used to divide the input signal, a polarization controller is necessary, otherwise the discriminator and logic circuit cannot properly make the correct decision because of the power difference. Naito et al, teaches a polarization control system, in which an optical polarization controller (e.g., polarization operating apparatus 20 in Figures 2 and 3) provided at a pre-stage of the optical polarization divider (e.g., polarization splitter 23 in Figures 2 and 3); a plurality of power monitoring units (e.g., the receivers 24 and 25 together with the differential amplifier 28; or the power monitors 42 and 43 in Figure 3) that respectively monitors optical signal powers on the paths; and a control circuit (e.g., the polarization control circuit 29 in Figures 2 and 3) that controls the optical polarization controller based on the optical signal powers (e.g., based on the differential signal b from the differential amplifier 28), wherein the control circuit controls the optical polarization controller such that output values of the optical signal powers monitored by the optical monitors become substantially equal (column 3, line 52-56, and column 4 line 53-57, to minimize the signal "b", that is, output values of the optical signal powers monitored by the optical monitors become substantially equal).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the polarization control mechanism as taught by Naito et al to the system of Tomizawa et al so that the power to the two paths can be substantially equal, and the discriminators can use the substantially same decision

threshold and make a desired decision, and then the system reliability can be

increased.

2). With regard to claim 26, Tomizawa et al disclose all of the subject matter as

applied to claims 23 and 25 above, but Tomizawa et al does not expressly disclose

monitoring the respective optical signal powers on the paths; and controlling the optical

polarization based on the optical signal powers such that output values of the monitored

optical signal powers become substantially equal.

In Figure 6, Tomizawa et al discloses that a polarization splitter can be used to

divide the input signal. However, for a system as shown in Figure 8, or a transmitter as

shown in Figures 5 and 7, when a polarization beam splitter is used to divide the input

signal, a polarization controller is necessary, otherwise the discriminator and logic circuit

cannot properly make the correct decision because of the power difference. Naito et al,

teaches a polarization control system, in which an optical polarization controller (e.g.,

polarization operating apparatus 20 in Figures 2 and 3) provided at a pre-stage of the

optical polarization divider (e.g., polarization splitter 23 in Figures 2 and 3); a plurality of

power monitoring units (e.g., the receivers 24 and 25 together with the differential

amplifier 28; or the power monitors 42 and 43 in Figure 3) that respectively monitors

optical signal powers on the paths; and a control circuit (e.g., the polarization control

circuit 29 in Figures 2 and 3) that controls the optical polarization controller (20 in

Figures 2 and 3) based on the optical signal powers (e.g., based on the differential

signal b from the differential amplifier 28) such that output values of the optical signal

powers monitored by the optical monitors become substantially equal (column 3, line

52-56, and column 4 line 53-57, to minimize the signal "b", that is, output values of the

optical signal powers monitored by the optical monitors become substantially equal).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to apply the polarization control mechanism as taught by

Naito et al to the system of Tomizawa et al so that the power to the two paths can be

substantially equal, and the discriminators can use the substantially same decision

threshold and make a desired decision, and then the system reliability can be

increased.

6.   Claims 17 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Tomizawa et al (US 2003/0118345) as applied to claims 12 and 23 above, and in

further view of Sawada et al (WO 03/026239; the corresponding English translation can

be found in US 2004/0131368) and Tago et al (US 2004/0165895).

1). With regard to claim 17, Tomizawa et al disclose all of the subject matter as

applied to claim 12 above, and Tomizawa et al further discloses a operational circuit

(e.g., Figures 3-6, the Consensus logic and Selection Circuit), to which a plurality of

discrimination results from the discriminators is respectively input (e.g., a plurality of

discrimination results from the discriminators having different threshold values is

respectively input), and a path selecting unit (e.g., Figures 3-6, the Selection Circuit 5)

that selects an output result having a low bit error rate based on monitoring information

([0037], [0047], [0056], the output result selected by the Consensus logic and Selection

Circuit has a "improved bit error characteristics").

But Tomizawa et al does not expressly disclose wherein the discriminators are soft decision discriminators, a plurality of operational circuits is provided, to which a plurality of discrimination results from the soft decision discriminators is respectively input, and a bit-error-rate monitoring unit that monitors a bit error rate of an output result of each of the operational circuits; and a path selecting unit that selects an output result having a low bit error rate based on monitoring information of the bit-error-rate monitoring unit.

However, Sawada et al teaches a plurality of soft decision discriminators (e.g., 7 in Figures 3 and 61, or 12 in Figure 4), a probability density distribution estimation circuit (9 in Figures 3 and 61, the probability density distribution estimation circuit is equivalent to the bit error monitoring unit) that monitors the probability density distribution of an output result. And in Figure 14, Sawada et al also discloses a path selecting unit (e.g., selector 23 in Figure 14) that selects outputs based on monitoring information of probability density distribution estimation.

Sawada et al does not expressly state to use the bit error rate for selection. However, another prior art, Tago, teaches bit-error-rate monitoring units (e.g., 46/48 in Figure 8, or 136/138 in Figure 11) that monitor a bit error rate of an output result of each of the discriminators; and then based on monitoring information of the bit-error-rate monitoring units, an optimal decision threshold is determined and used to discriminate the received signals.

But, the combination of Tomizawa et al and Sawada et al and Taga does not expressly disclose a plurality of operational circuits. However, as discussed above,

Tomizawa et al teaches a single operational circuit (e.g., Figures 3-6, the Consensus

logic and Selection Circuit), and a plurality of discrimination results from a plurality

discriminators with different threshold values is respectively input to the single

operational circuit. As shown in Figure 3, the set of decision circuit 3-11 to 3-1n has a

"threshold value 1", and the set of decision circuit 3-21 to 3-2n has a "threshold value 2",

and the set of decision circuit 3-k1 to 3-kn has a "threshold value k"; that is, the single

Consensus Logic 4 can process k sets of inputs. In applicant's disclosure, as shown in

Figure 7, when a plurality of operational circuits is provided, each operational circuit only

receives one set of input which corresponding to a specific decision threshold (Figure 7,

e.g., the operational circuit 71-1 receives the results from the discriminators with

decision threshold Vth1, and the operational circuit 71-2 receives the results from the

discriminators with decision threshold Vth2). Although Tomizawa et al and Sawada et al

and Taga do not specifically disclose a plurality of operational circuits (each receives

specific discrimination results), such limitation are merely a matter of design choice and

would have been obvious in the system of Tomizawa et al and Sawada et al and Taga.

The combination of Tomizawa et al and Sawada et al and Taga teaches that a plurality

of discrimination results from a plurality discriminators with different threshold values is

respectively input to the operational circuit, and then a control signal is sent to the

selection unit to obtain the desired result. The limitations in claim 17 do not define a

patentably distinct invention over that in Tomizawa et al and Sawada et al and Taga

since both the invention as a whole and Tomizawa et al and Sawada et al and Taga are

directed to select and output the result with improved BER. To use a single operational

circuit for all discriminators or use a plurality of operational circuits each responds a specific decision threshold is not critical for the invention as a whole and presents no new or unexpected results, so long as the desire control signal is sent and the result with improved BER is successfully obtained.

Tomizawa et al teaches an operational circuit and path selecting unit to obtained an output with improved bit error rate; and Sawada et al teaches a soft decision discriminator and the information from the probability density distribution can be used to determine the decision level and also can be used to select the outputs from the soft decision discriminators; and Taga etc teaches to directly use the BER to determine the decision threshold etc. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Sawada et al and Taga to the system of Tomizawa et al so that the bit error rate can be used to control the decision level of the soft decision discriminator and also be used to select the output with low BER, and the selection of the results can be made easier and convenient.

2). With regard to claim 28, Tomizawa et al disclose all of the subject matter as applied to claim 23 above, and Tomizawa et al further discloses a operational circuit (e.g., Figures 3-6, the Consensus logic and Selection Circuit), to which a plurality of discrimination results from the discriminators is respectively input (e.g., a plurality of discrimination results from the discriminators having different threshold values is respectively input), and a path selecting unit (e.g., Figures 3-6, the Selection Circuit 5) that selects an output result having a low bit error rate based on monitoring information

([0037], [0047], [0056], the output result selected by the Consensus logic and Selection
Circuit has a "improved bit error characteristics").

But Tomizawa et al does not expressly disclose wherein the discriminators are
soft decision discriminators, and providing a plurality of operational circuits, to which a
plurality of discrimination results from the soft decision discriminators is respectively
input, and monitoring a bit-error-rate of an output result of each of the operational
circuits; and selecting an output result having a low bit error rate based on monitoring
information of the bit-error-rate monitoring unit.

However, Sawada et al teaches a plurality of soft decision discriminators (e.g., 7
in Figures 3 and 61, or 12 in Figure 4), a probability density distribution estimation circuit
(9 in Figures 3 and 61, the probability density distribution estimation circuit is equivalent
to the bit error monitoring unit) that monitors the probability density distribution of an
output result. And in Figure 14, Sawada et al also discloses a path selecting unit (e.g.,
selector 23 in Figure 14) that selects outputs based on monitoring information of
probability density distribution estimation.

Sawada et al does not expressly state to use the bit error rate for selection.
However, another prior art, Tago, teaches bit-error-rate monitoring units (e.g., 46/48 in
Figure 8, or 136/138 in Figure 11) that monitor a bit error rate of an output result of each
of the discriminators; and then based on monitoring information of the bit-error-rate
monitoring units, an optimal decision threshold is determined and used to discriminate
the received signals.

But, the combination of Tomizawa et al and Sawada et al and Taga does not expressly disclose a plurality of operational circuits. However, as discussed above, Tomizawa et al teaches a single operational circuit (e.g., Figures 3-6, the Consensus logic and Selection Circuit), and a plurality of discrimination results from a plurality discriminators with different threshold values is respectively input to the single operational circuit. As shown in Figure 3, the set of decision circuit 3-11 to 3-1n has a "threshold value 1", and the set of decision circuit 3-21 to 3-2n has a "threshold value 2", and the set of decision circuit 3-k1 to 3-kn has a "threshold value k"; that is, the single Consensus Logic 4 can process k sets of inputs. In applicant's disclosure, as shown in Figure 7, when a plurality of operational circuits is provided, each operational circuit only receives one set of input which corresponding to a specific decision threshold (Figure 7, e.g., the operational circuit 71-1 receives the results from the discriminators with decision threshold Vth1, and the operational circuit 71-2 receives the results from the discriminators with decision threshold Vth2). Although Tomizawa et al and Sawada et al and Taga do not specifically disclose a plurality of operational circuits (each receives specific discrimination results), such limitation are merely a matter of design choice and would have been obvious in the system of Tomizawa et al and Sawada et al and Taga. The combination of Tomizawa et al and Sawada et al and Taga teaches that a plurality of discrimination results from a plurality discriminators with different threshold values is respectively input to the operational circuit, and then a control signal is sent to the selection unit to obtain the desired result. The limitations in claim 17 do not define a patentably distinct invention over that in Tomizawa et al and Sawada et al and Taga

since both the invention as a whole and Tomizawa et al and Sawada et al and Taga are directed to select and output the result with improved BER. To use a single operational circuit for all discriminators or use a plurality of operational circuits each responds a specific decision threshold is not critical for the invention as a whole and presents no new or unexpected results, so long as the desire control signal is sent and the result with improved BER is successfully obtained.

Tomizawa et al teaches an operational circuit and path selecting unit to obtained an output with improved bit error rate; and Sawada et al teaches a soft decision discriminator and the information from the probability density distribution can be used to determine the decision level and also can be used to select the outputs from the soft decision discriminators; and Taga etc teaches to directly use the BER to determine the decision threshold etc. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Sawada et al and Taga to the system/method of Tomizawa et al so that the bit error rate can be used to control the decision level of the soft decision discriminator and also be used to select the output with low BER, and the selection of the results can be made easier and convenient.

7.   Claims 19 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomizawa et al (US 2003/0118345) as applied to claim 12 and 23 above, and further in view of Hayee et al (US 7,209,671).

1). With regard to claim 19, Tomizawa et al disclose all of the subject matter as applied to claim 12 above. But, Tomizawa et al does not expressly disclose wherein the operational circuit is a logical AND circuit.

However, Tomizawa et al discloses that the control circuit (consensus logic) can be realized using an OR circuit or an Exclusive OR circuit ([0072]), the threshold values of the discriminators can be higher than the standard threshold or lower than the standard threshold. And another prior art, Hayee et al, discloses an operational circuit (e.g., the Output Decision Circuit in Figure 2, or Figure 5) switches a function of the logical operation based on a control signal (Figure 6, and step 806 in Figure 8; column 7 line 22-64, column 8 line 18-24, and column 9 line 26-36; the output decision circuit applies a selected logic function: OR, AND and XOR).

Hayee et al provide a reliable detection of the received data signal, and the best logic strategy choices can be loaded. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the logical AND circuit as taught by Hayee et al to the system of Tomizawa et al so that a reliable receiver with improved BER can be obtained.

2). With regard to claim 30, Tomizawa et al disclose all of the subject matter as applied to claim 23 above. But, Tomizawa et al does not expressly disclose wherein the predetermined logical operational is a logical AND circuit.

However, Tomizawa et al discloses that the control circuit (consensus logic) can be realized using an OR circuit or an Exclusive OR circuit ([0072]), the threshold values of the discriminators can be higher than the standard threshold or lower than the

standard threshold. And another prior art, Hayee et al, discloses an operational circuit

(e.g., the Output Decision Circuit in Figure 2, or Figure 5) switches a function of the

logical operation based on a control signal (Figure 6, and step 806 in Figure 8; column 7

line 22-64, column 8 line 18-24, and column 9 line 26-36; the output decision circuit

applies a selected logic function: OR, AND and XOR).

Hayee et al provide a reliable detection of the received data signal, and the best

logic strategy choices can be loaded. Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to use the logical AND circuit

as taught by Hayee et al to the system of Tomizawa et al so that a reliable receiver with

improved BER can be obtained.

8.   Claims 20, 21 and 31 and 32 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Tomizawa et al (US 2003/0118345) as applied to claim 12 and 23

above, and further in view of Tago et al (US 2004/0165895) and Hayee et al (US

7,209,671).

1). With regard to claim 20, Tomizawa et al disclose all of the subject matter as

applied to claim 12 above. But, Tomizawa et al does not expressly discloses a bit-error-

rate monitoring unit that monitors a bit error rate of an output result of the operational

circuit; and a discrimination-threshold control circuit that changes levels of the

predetermined thresholds of the discriminators based on monitoring information of the

bit-error-rate monitoring unit, wherein the operational circuit switches a function of the

logical operation based on the levels of the predetermined thresholds of the

discriminators.

However, Tago et al teaches a bit-error-rate monitoring unit (e.g., 46/48 in Figure 8, or 136/138 in Figure 11) that monitors a bit error rate of output results from one set of discriminators; and a discrimination-threshold control circuit (the Threshold generator in Figure 8, or the Threshold controller 140 in Figure 11) that changes levels of the predetermined thresholds of the discriminator (the Discriminator 40 in Figure 8, or 130 in Figure 11) based on monitoring information of the bit-error-rate monitoring units.

Tago et al teaches a system and method to rapidly determine the best threshold value for the discriminator and stably discriminate a received signal regardless of a time variation. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Taga to the system of Tomizawa et al so that the bit error rate can be used to control the decision level of the discriminators, and then the receiver can rapidly provide the optimum result.

But, Tago does not expressly discloses the operational circuit switches a function of the logical operation based on the levels of the predetermined thresholds of the discriminators.

However, Tomizawa et al discloses that the control circuit (consensus logic) can be realized using an OR circuit or an Exclusive OR circuit ([0072]), the threshold values of the discriminators can be higher than the standard threshold or lower than the standard threshold. And another prior art, Hayee et al, discloses an operational circuit (e.g., the Output Decision Circuit in Figure 2, or Figure 5) switches a function of the logical operation based on the predetermined thresholds of the discriminators or instruction from a look-up control signal (Figure 6, and step 806 in Figure 8; column 7

line 22-64, column 8 line 18-24, and column 9 line 26-36; the output decision circuit

applies a selected logic function: OR, AND and XOR).

By selection of the logical operation, Hayee et al provide a reliable detection of

the received data signal, and the best logic strategy choices can be loaded. Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was

made to apply the mechanism of selecting the logical operation as taught by Hayee et al

to the system of Tomizawa et al and Taga so that the best logic operation can be used

for the specific decision levels of the discriminators, and the reliability of the receiver

can be further improved.

2). With regard to claim 21, Tomizawa et al and Taga and Hayee et al disclose all

of the subject matter as applied to claim 20 above. And the combination of Tomizawa et

al and Taga and Hayee et al further discloses wherein the function of the logical

operation includes a logical OR operation and a logical AND operation (Hayee et al:

(step 806 in Figure 8; column 8 line 18-24, and column 9 line 26-36; the output decision

circuit applies a selected logic function: OR, AND and XOR).

3). With regard to claim 31, Tomizawa et al disclose all of the subject matter as

applied to claim 12 above. But, Tomizawa et al does not expressly discloses monitoring

a bit error rate of an output result performed by said predetermined logical operation;

and changing levels of the predetermined thresholds based on monitoring information of

the bit-error-rate; and switching a function of the logical operation based on the levels of

the predetermined thresholds.

However, Tago et al teaches a bit-error-rate monitoring unit (e.g., 46/48 in Figure 8, or 136/138 in Figure 11) that monitors a bit error rate of output results from one set of discriminators; and a discrimination-threshold control circuit (the Threshold generator in Figure 8, or the Threshold controller 140 in Figure 11) that changes levels of the predetermined thresholds of the discriminator (the Discriminator 40 in Figure 8, or 130 in Figure 11) based on monitoring information of the bit-error-rate monitoring units.

Tago et al teaches a system and method to rapidly determine the best threshold value for the discriminator and stably discriminate a received signal regardless of a time variation. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teaching of Taga to the system of Tomizawa et al so that the bit error rate can be used to control the decision level of the discriminators, and then the receiver can rapidly provide the optimum result.

But, Tago does not expressly discloses the operational circuit switches a function of the logical operation based on the levels of the predetermined thresholds.

However, Tomizawa et al discloses that the control circuit (consensus logic) can be realized using an OR circuit or an Exclusive OR circuit ([0072]), the threshold values of the discriminators can be higher than the standard threshold or lower than the standard threshold. And another prior art, Hayee et al, discloses an operational circuit (e.g., the Output Decision Circuit in Figure 2, or Figure 5) switches a function of the logical operation based on the predetermined thresholds of the discriminators or instruction from a look-up control signal (Figure 6, and step 806 in Figure 8; column 7

line 22-64, column 8 line 18-24, and column 9 line 26-36; the output decision circuit
applies a selected logic function: OR, AND and XOR).

By selection of the logical operation, Hayee et al provide a reliable detection of
the received data signal, and the best logic strategy choices can be loaded. Therefore, it
would have been obvious to one of ordinary skill in the art at the time the invention was
made to apply the mechanism of selecting the logical operation as taught by Hayee et al
to the system and method of Tomizawa et al and Taga so that the best logic operation
can be used for the specific decision levels of the discriminators, and the reliability of
the receiver can be further improved.

4). With regard to claim 32, Tomizawa et al and Taga and Hayee et al disclose all
of the subject matter as applied to claim 23 and 31 above. And the combination of
Tomizawa et al and Taga and Hayee et al further discloses wherein the function of the
logical operation includes a logical OR operation and a logical AND operation (Hayee et
al: (step 806 in Figure 8; column 8 line 18-24, and column 9 line 26-36; the output
decision circuit applies a selected logic function: OR, AND and XOR).

Conclusion

9.   Applicant's amendment necessitated the new ground(s) of rejection presented in
this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP
§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37
CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Monday-Friday, 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Li   Liu/
Examiner, Art Unit 2613
March 3, 2010